THE EFFECT OF VIBRATION ON THE MORPHOLOGIC PATTERN OF ENDOCRINE GLANDS

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THE EFFECT OF VIBRATION ON THE MORPHOLOGIC PATTERN OF ENDOCRINE GLANDS

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ABSTRACT. After vibration of frequency 1800/min and amplitude of 6 mm in the vertical and 4 mm in the horizontal direction, no changes were found in the thyroid gland or ovaries. The adrenal glands were enlarged, their medullary portion was hyperemic, and the zona fasciculata was slightly enlarged. The changes in the adrenal glands of white mice were attributed to stress connected with vibration.

As found in numerous reports, various changes appear in the organism under /561* the influence of vibration. Changes were observed in joints, bones, muscles, vessels etc. Intensity and localization of these changes,as well as the time at which they appear, depend on the frequency, amplitude, and duration of vibration. Recently, biochemic changes due to vibration have been noticed. Thus, for example, Stanosek et al. in an experiment with animals discovered changes in the activity of alanine and asparagin aminotransferase at 5 hertz and an amplitude of 20 mm. Stoklosa demonstrated changes in the behavior of phosphateses in the parenchymal organs of animals. Babadzanian et al. described disorders in the menstrual period in women who worked with compressed-air hammers. Komorowska and Krolikowska analyzed the relation between the frequency of miscarriages and premature childbirths, and the kind of work performed by Lodz** female textile workers. Vibrations, therefore, can cause various changes in different tissues and organs.

In the literature accessible to us, we have not found any information on the effect of vibrations on endocrine glands. In the experiment presented below, we therefore decided to find out whether vibrations can cause changes in these glands. We have studied only some endocrine glands.

Materials and Methods

In the experiment we have used white virgin mice, 20-22g in weight, of the same breed, identically fed and maintained under the same environmental conditions. We utilized vibration devices of 1800 oscillations per second, with an amplitude of 6 mm in the vertical direction and 4 mm in the horizontal direction. The first group consisted of control mice. The second group, composed of 30 mice, was subjected to vibrations twice a day for 15 minutes for 10 days. The third group, 30 mice, was subjected to vibrations three times a day for 30 days, 10 minutes each day. Samples were taken of the thyroid gland,

* Note: Numbers in the margin indicate pagination in the original foreign text.
** Translator's Note: Lodz is Poland's main center of the textile industry.

ovaries, and the adrenal glands. The thyroid gland was fixed in alcohol-formol and paraffin strips were dyed with hematoxylin and eosin. Ovaries were fixed in 10% formol. Paraffin strips were made from one ovary, and subsequently dyed with hematoxylin and eosin. From the other ovary, frozen strips were dyed with scarlet R according to the method by Hexheimer. The adrenal glands were treated in a similar way.

Results of the Investigations

The thyroid glands of mice from both groups subjected to vibrations have not shown any histological changes, as compared with the pattern for thyroid glands of the control animals.

No deviations from the norm were found in survey specimens prepared from the ovaries of both groups of animals subjected to vibrations. Similarly, no differences were detected in the amount and distribution of lipids dyed with scarlet R.

The adrenal glands of mice subjected to vibrations were macroscopically larger than those of the mice from the control group. In the survey specimens made from the adrenal glands of animals subjected to vibrations, we found hyperemia of the medullary portion of the adrenal glands, and sometimes blood on the outside of the vessels. Furthermore, we discovered that the zona fasciculata of the adrenal glands was slightly enlarged. No differences were detected in the amount and distribution of lipids.

Analysis of the Results

Under the action of vibration described above, we have not found any changes in the thyroid gland and ovaries. The adrenal glands were slightly enlarged, the medullary portion was hyperemic, and the zona fasciculata was somewhat wider than normal. These changes are considered to be a result of the adaptation reaction, with vibrations being a serious stress to the organism.

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